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TITLE

AN INSTANCE OF THE APPARENT EFFECT OF ROAD CONSTRUCTION ON MOUNTAIN PINE BEETLE INFESTATIONS IN WESTERN WHITE PINE

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Forest Insect Laboratory
Coeur d'Alene, Idaho
March 11, 1939

SUBJECT—

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Forest Insect Laboratory
Coeur d'Alene, Idaho
March 23, 1939

Dr. F. C. Craighead

Washington, D. C.

Dear Dr. Craighead:

I am enclosing two copies of an illustrated report by Mr. Bedard describing an instance of the apparent effect of road construction on mountain pine beetle infestations in western white pine. The extra copy is for transmittal to the Forest Service at Washington.

This report is not the result of a special study, the observations and photographs being incidental to Mr. Bedard's work on the infestation study. The report describes conditions existing within the Deception Creek drainage of the Coeur d'Alene National Forest. In view of the severe destruction of white pine along newly constructed forest highways, Mr. Bedard has suggested that all white pine trees within one chain of the road be removed and that the other tree species be left to protect the site and to shade the remaining white pine trees adjacent. I have no comments to make on this suggestion other than to state that there are other factors involved in such action that would need be considered. If most of the trees within such a strip along newly constructed forest highways are to die within a few years following construction, then obviously the trees should be salvaged while still green. On the other hand, it may be possible to prevent such damage and preserve the scenic attractiveness of the pine.

Your comments on this report will be appreciated.

Respectfully yours,

JAMES C. EVENDEN
Senior Entomologist

Enclosures

cc to Mr. Miller, Mr. Keen, Dr. Beal

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Since the advent of a more intensive road construction program in 1933, entomologists and foresters alike have noted a prevalence of roadside killing by both primary and secondary bark beetles. The seriousness of such killing varies according to the diversity of circumstances under which the roads are constructed, but in all cases results in a sufficient quantity of roadside snags to be an eyesore to forest travelers.

Although no separate project was planned to undertake a study of this situation, some data were secured as a result of a study of the mountain pine beetle infestation in western white pine on the Coeur d'Alene National Forest and are believed to be of sufficient value to be presented in report form. The situation discussed is located on the Coeur d'Alene National Forest along that portion of the Deception Creek road from the junction of the Coeur d'Alene-Honeysuckle road approximately four miles to the switch-back at the head of the creek, and along the so-called south side road which extends from Ames Creek to Montford Creek along the south side of Deception Creek. Both of these roads were constructed close to the creek bottom through a stand of western white pine ranging in age from 150 to 180 years.

Types of Road Injury

Road injury to trees occurs in two general periods, namely those mechanical injuries which result from actual road construction such as removing or exposing roots in excavation, barking of trees by dynamite,

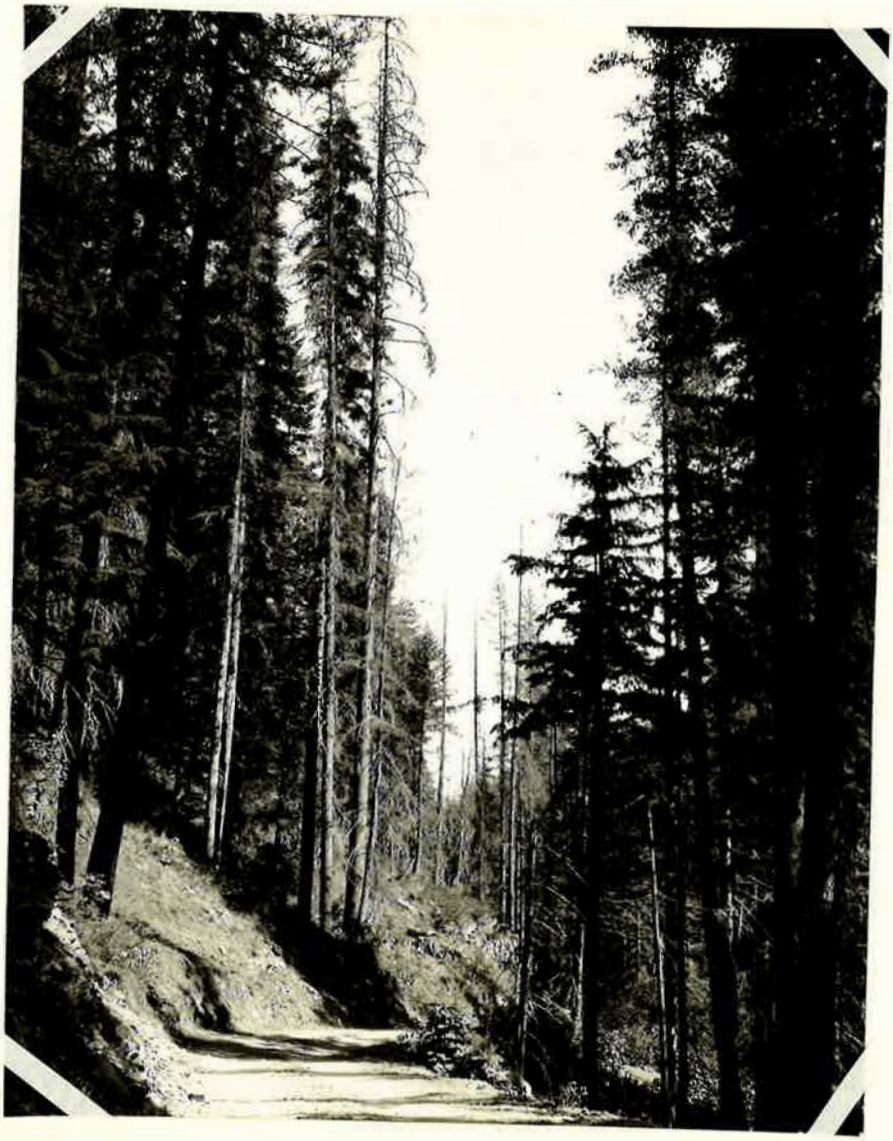

Figure 1 - General view of a portion of Deception Creek bottom showing snags of insect-killed trees. Many more such snags would be in evidence had not the infestation study crew felled them for examination.

scorching of trees during slash disposal, and girdling of trees with chokers and other cable lines. Other injuries which result indirectly from road construction and which do not become evident until a few years after the road has been constructed, are caused by piling of dirt high on the boles of trees below the road, sunscald, and general site deterioration as a result of drying.

Root Injury

Tree roots exposed or cut off in the excavation of cuts causes a serious injury which results in the attack of the weakened side by secondary bark beetles, dying of the weakened side without insect attack, or killing of the entire tree by primary bark beetles. If the entire tree is not killed, this type of injury is often not apparent for a number of years until the bark begins to peel from the dry face. Typical examples of this injury are shown in figures 2 and 3.

Dynamite Injury

Flying rocks often remove large areas of bark from white pine trees in the vicinity of rock ledges which are dynamited in the process of road construction. An example of such injury is shown in figure 4. This injury varies from a small barked area to those trees in which practically all of the bark has been removed from one side at the base of the tree with even some of the wood fibers broken. Such injury invariably results in attack by the mountain pine beetle and sometimes by secondary bark beetles. In some cases the attacking beetles are drowned by excessive pitch flow so that not all dynamite injured trees are killed. However, they are invariably scarred with barked areas and masses of white pitch

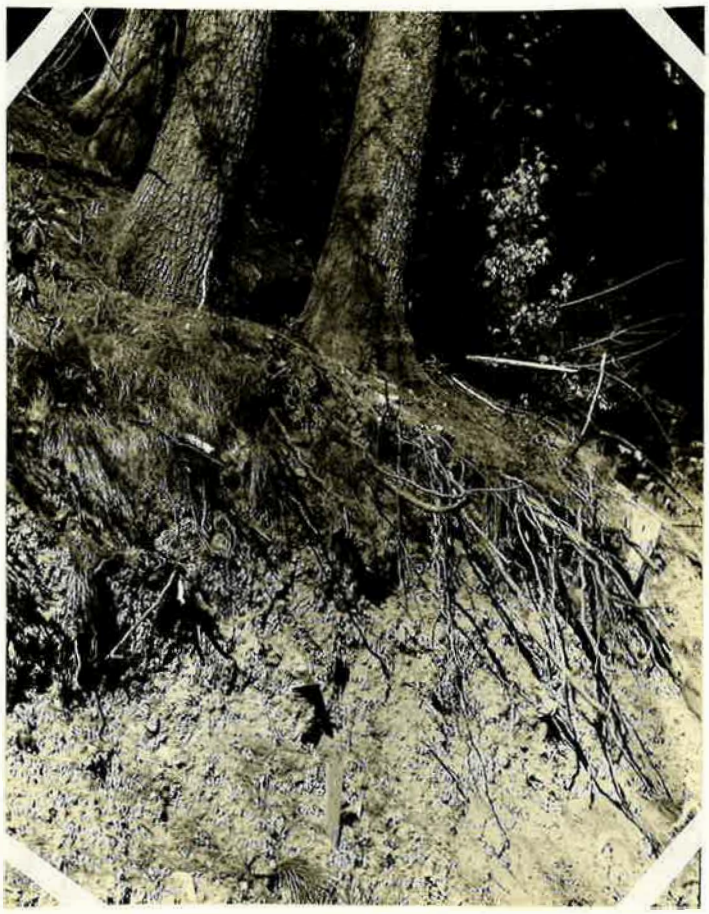

Figure 2 - Road excavation causes the exposure and removal of roots as shown in this photograph. Such injury results in the death of the injured side of the tree apparent in the tree on the right where a piece of bark has been removed from the dead side.

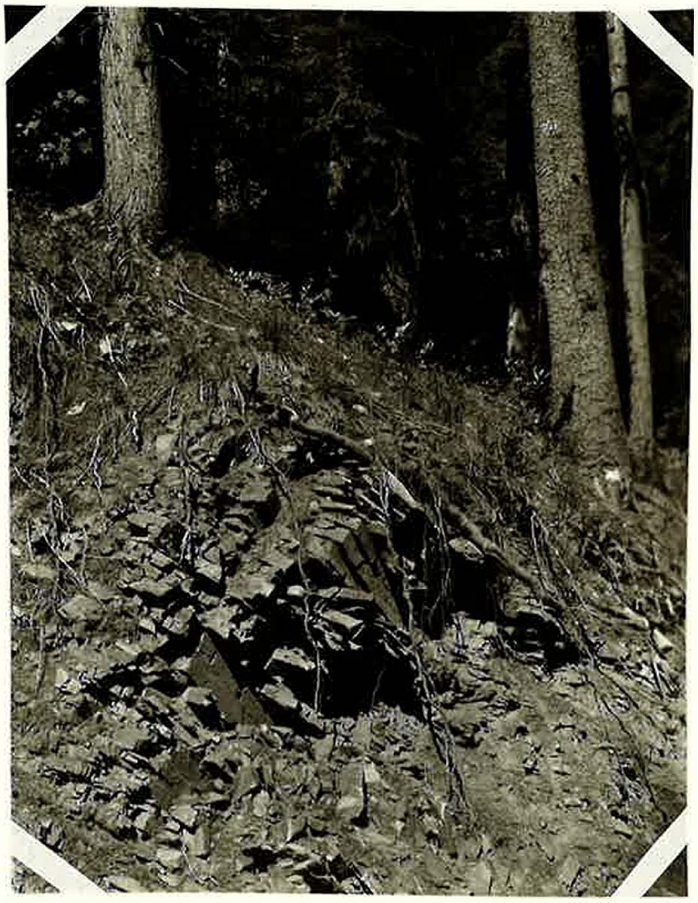

Figure 3 - Removal of roots by back-sloping shown in this picture causes dead sides, one of which is apparent at the root collar on the small white pine at the right of the photograph.

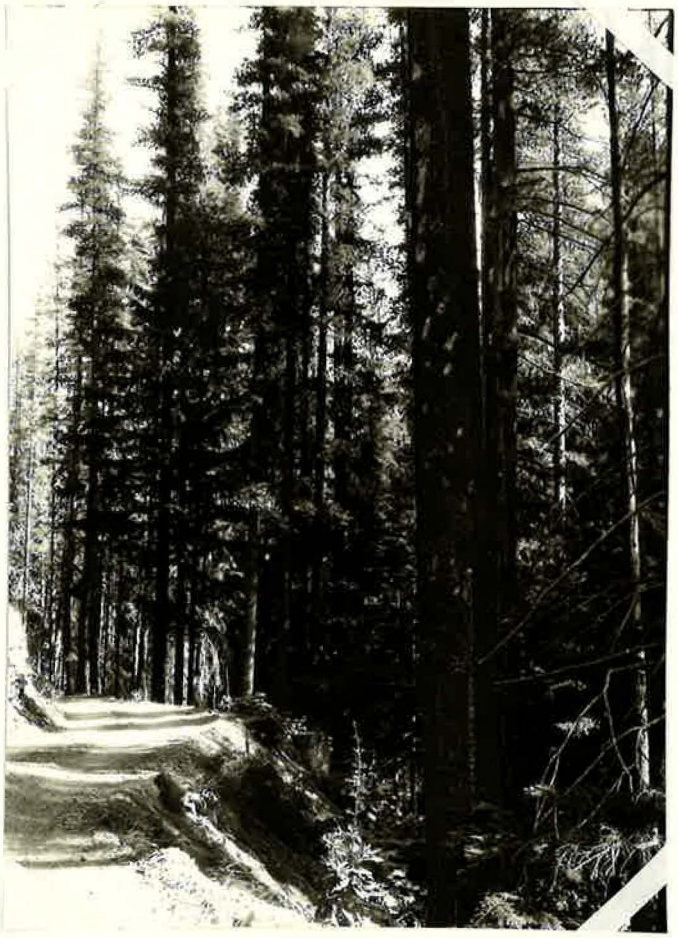

Figure 4 - Dynamite injury is apparent on two trees in the foreground. Such trees are usually eventually attacked and killed by the mountain pine beetle. Some are injured so severely that secondary bark beetles alone overcome their final resistance and kill one or both sides.

flow, are often dry-sided, and in many cases killed by beetle attack. Another important effect resulting from this type of injury is the attraction of bark beetles to the area by the abundant flow of fresh pitch.

Fire Damage

Disposal of slash and logs cut from the road right of way often results in unnecessary injury to standing white pine trees. One of the primary causes of injury is the improper placement of log decks and brush piles so that adjacent white pine trees, being readily susceptible to heat, are scorched so severely that they die as a result of the scorching or become easy victims of the mountain pine beetle. Scorching of green timber also invariably sets up an attraction which brings in more than enough beetles to attack the weakened materials, so that often times adjacent healthy trees are attacked and killed.

Choker Injury

The recent policy of salvaging white pine logs cut from the right of way has created a new type of road injury which results from the guying of jammers and other equipment to white pine trees. The use of white pine for this purpose is often necessary because a road-side cleanup program has left nothing but white pine within a suitable distance. In other cases the policy appears to have been to remove all so-called inferior species well beyond the necessary right of way, while white pine was left to within the minimum width of the road. Choker injury itself may well cause the girdling and death of a tree as shown in figure 5. Often times the injury so weakens the tree that it falls an easy prey to beetle attack.

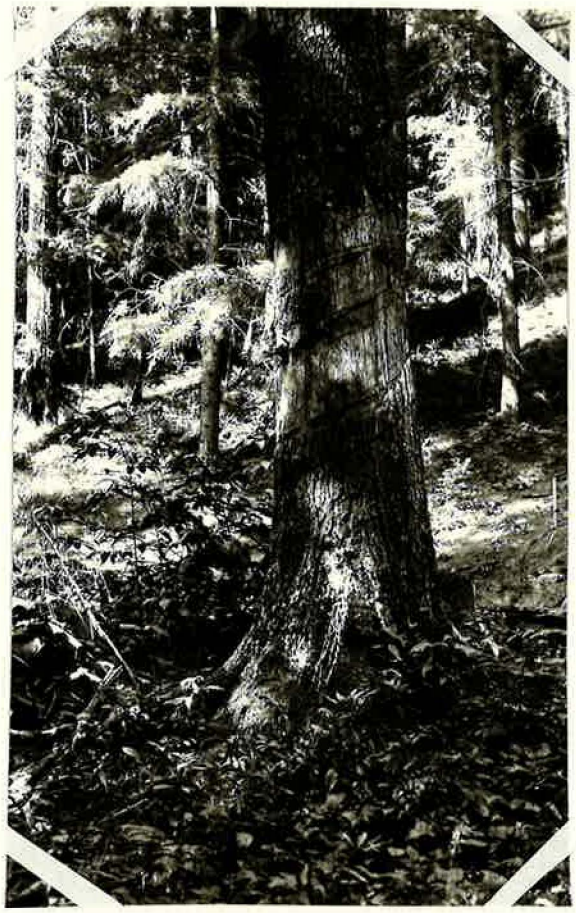

Figure 5 - Choker injury caused the death of this tree and made it suitable material for bark beetle attack. Such injury is needless.

Covering the Tree Bole

Among those injuries which are directly attributable to road construction but which are slower to become apparent than those previously mentioned, is one type which results from pushing dirt from the roadway so that it piles high around the boles of trees sufficiently close below the road. Other than direct damage to the bole by falling rocks, the physiology of this injury is not known. Some white pine trees apparently can withstand having the basal 5, 10, or 15 feet covered with dirt, but in other cases the foliage begins to yellow within a few years and eventually the tree succumbs to beetle attack.

Sun Scald

Some tree mortality, although not resulting directly from mechanical injury, is an indirect result of road construction. Trees immediately bordering the road, having been accustomed to the dense shade of the white pine type, are exposed to the direct rays of the sun and often, particularly in young stands, suffer drying out and killing of the exposed side.

Site Deterioration

Opening of the timber stand by road construction and additional openings caused by insect kill results in a deterioration of site immediately bordering the road. Whether the change is caused by drying as a result of increased sunlight or lowering of the water table resulting from excavation, or whether the change is induced by some other cause, is not known. The fact remains, however, that trees within the affected area bordering the road become weakened and are more susceptible to bark beetle attack.

Insect Damage Along Road Way

Although no data are available to prove conclusively the effect of road construction in western white pine stands on mountain pine beetle infestations in this timber species, table I has been prepared to show the number of trees killed by this insect according to the distance from the road. During the course of the infestation study within this area, practically a 100 percent examination was secured of the 15 chains on either side of the road during 1936, 1937 and 1938. In table I the trees are grouped to show their occurrence at distances of one, five, ten and fifteen chains from the road.

TABLE I
TREES KILLED ACCORDING TO DISTANCE FROM ROAD

Distance from road	Chains 1	5	10	15
Trees killed	133*	64	12	5
Percent	62.5	29.6	5.6	2.3
Accumulative total	133	199	211	216
Percent	62.5	92.1	97.7	100.0

* 80 of these trees (59.3 percent) were located between the road and the creek.

It is readily apparent in table I that the greatest number of trees have been killed within one chain of the road and that 92 percent of the mortality occurred within a distance of five chains of the road. As previously stated, these data were secured only during the past three

seasons, with incomplete data for the 1934 season. Insect control work was done in this area in the spring of 1935 and many trees were treated in the creek bottom, but no records are available for this work.

The trees shown in table I averaged 15.7 inches in diameter and represent an approximate volume of 86,400 board feet. The unrecorded losses in 1934 and 1935 would undoubtedly have brought the total loss well over 100,000 board feet.

As indicated by the distribution of this loss, bark beetles are apparently attracted to the injured and weakened trees along newly constructed roadways. Having been attracted to the area, adjacent healthy trees are killed as well as the weakened and injured material. It is also believed that the weakened material allows the beetles to build up in larger than normal numbers so that considerable nearby green stand is eventually killed.

Conclusions

Road construction in western white pine results in a certain amount of injury to roadside trees and although no definite proof has been secured, available data indicate that bark beetles are not only attracted to the area, but develop in greater than normal numbers in the weakened material, resulting in a considerable mortality to adjacent timber stands. No experimental work has been done in developing measures to prevent this loss, but it is believed that the nature of the damage itself suggests the remedy.

Fire injury can be avoided by careful location of brush piles. Likewise chafer injury can be eliminated by avoiding the use of white pine trees for cable moorings, or if this is necessary, by protecting the tree with a complete ring of substantial wood blocks. Injury by dynamite, piling of dirt, and exposure or removal of roots can only be avoided by removing all trees subject to such injury. Since, as indicated, many trees immediately adjacent to the road are doomed to die, it is believed the wise policy would be to cull these trees along with the logs actually cut from the right of way. The extent of site injury is not known, but it is suggested that all white pine within one chain of the road be removed, and that all other tree species be left in this area to protect the site and shade adjacent white pine.

As previously stated these possible preventative measures are purely theoretical suggestions. However, it is believed that the amount and extensiveness of roadside killing by bark beetles in the instances discussed indicates the necessity of some remedial steps.

Respectfully submitted,

W. D. Bedard
Associate Entomologist